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CHEMICAL AND ISOTOPE CHARACTERISTICS OF KIDNEY STONES (URINARY CALCULI) FROM SRI LANKA

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Mineralogical, chemical and isotope characteristics of fifty (50) urinary calculi samples collected from removal surgeries were investigated. Fourier Transform Infrared Spectroscopy (FT-IR) technique was used to determine the mineralogical composition while elements Na, K, Ca, Mg, Zn and Fe in kidney stones were determined using Atomic Absorption Spectrophotometry. Stable isotope ratios of ^{13}C and ^{18}O were measured with isotope ratio mass spectrometer (IRMS). Stone samples were classified into four mineral groups based on FTIR characteristics in which whewellite (calcium oxalate) stones are dominant among apatite, uric acid (uricite) and struvite stones. Apatite stones are enriched with trace elements compared to other stone types in which phosphates act as an important metal-bearing phase. Uricite stones showed the lowest trace metal contents. The $\delta^{13}C$ of urinary calculi ranged between -34 and -17 ‰ whereas $\delta^{18}O$ value of kidney stones varies from -8.94 and -26.72‰. Most samples, particularly whewellite and apatite-uricite stones indicated more depleted $\delta^{13}C$ values (-32 to -34‰). Since the isotopic composition of animal biominerals reflect those of ingested food and water, the more depleted $\delta^{13}C$ in kidney stones are possibly due to heavy consumption of C_3 dietary components. The isotope fractionation between inorganic reservoirs and biominerals of human body is important to understand the sources of elements in such biomaterials.

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